instance it would surely have been well for the author to have departed from his rule and introduced the latter term as a synonym. A still more glaring instance of the inadvisability of dropping all mention of synonyms occurs in treating of the lesser shrew (p. 13), for which the name *Sorex minutus*, Linn., is adopted, in place of the later *S. pygmæus*, Pall. Now, the author refers to Bell's "British Quadrupeds" for the distinctive characters of this species, which is there mentioned only as *S. pygmæus;* thus laying himself open to the criticism of those who are not specialists that he has confused the terms *pygmæus* and *minutus*. This species has, moreover, never been recognized in the district, so that its mention seems rather unnecessary. In discarding the name *Lepus timidus* in favour of *L. europæus* for the common hare, our author follows those who regard the letter of the law as more than the spirit; and although there is but little, if any, doubt that at least some of the hares to which Linnæus applied the name of *L. timidus* were really of that species to which we commonly apply the name *L. variabilis*, yet we cannot help thinking that the former name might be advantageously retained in its common acceptation.

Among the Ungulata, the author retains the fossil *Bos longifrons* (*frontosus*) as a distinct species, although it has been shown over and over again that it can only be regarded as a race of *B. taurus*. Similarly, all recent observations tend to show that *Bos primigenius* is nothing more than a larger variety of the same species; while there appear to be no valid grounds for specifically distinguishing the Pleistocene *Bison priscus* from the living Lithuanian aurochs. The author would confer a great benefit upon palæontologists if he could show how the skull he refers to the so-called *Sus palustris* can be specifically distinguished from one of *S. scrofa*.

In commenting upon the absence of remains of fossil Carnivora from the Leicestershire Pleistocene, Mr. Browne does not appear to be aware how extremely rare these remains are in the equivalent deposits of other counties. Thus, at Barrington, in Cambridgeshire, where bones and teeth of Ungulates are found by the hundred or thousand, those of Carnivores may be reckoned by units or tens; and the introduction of special hypotheses to account for their absence in Leicestershire is, therefore, quite superfluous.

The total number of mammals mentioned is forty-eight (including man), but of this list only twenty-five are now found in a wild state in the area described. The number of species of birds is very large, as we might expect in an area of the size of that forming the subject of the work. Several species, such as the gannet, cormorant, &c., are, however, but occasional stragglers from the coast; while in other cases, as we have already remarked, the evidence of occurrence within the two counties is of the slightest. A good lithographic plate of Pallas's sand-grouse, and a coloured one of the cream-coloured courser, are given; and we also have an elaborate table of the dates of arrival of summer immigrants. In the reptiles, the five existing species are almost lost among a number of fossil forms, to which they have but a very remote kinship. This swamping of recent forms by their fossil allies is, however, not so marked among the fishes, owing to the circumstance that all the fossil forms belong to extinct families, which follow the recent ones. Mr. Browne follows Prof. Cope in abolishing the orders Teleostei and Ganoidei, and arranging the representatives of the former and the typical groups of the latter in a sub-class Teleostomi, which is ranked as equivalent to the Elasmobranchii. The *Salmonidæ* are thus immediately followed by a family which the author, in defiance of all grammatical rules, terms *Leptolepidæ*, and which forms a transition from the Ganoids to the Teleostei. It seems strange that, while employing the correctly-formed term *Rhizodontidæ* (instead of *Rhizodidæ*), the author should retain names like *Leptolepidæ* and *Osteolepidæ* in place of *Leptolepididæ* and *Osteolepididæ*; but here, perhaps, he merely follows those who ought to know better. The number of fossil fishes from the Lias quarries of Barrow-on-Soar is very considerable; and we believe that the Leicester Museum is rich in this respect, as well as in the remains of Saurians from the same locality.

The author seems to have spared no labour in looking up references and making his work in all respects as nearly complete as possible; and, since the volume is handsomely got up and well printed, with a remarkable freedom from misprints, it should take a place in the first rank of local faunas.

R. L.

THE SCIENTIFIC PAPERS OF ASA GRAY.

Scientific Papers of Asa Gray. Selected by Charles Sprague Sargent. Two Vols. (London: Macmillan and Co., 1889.)

NO more fitting monument could have been raised to the memory of the late Dr. Asa Gray—who was almost as well known to botanists on this side of the Atlantic as on the other—than a reprint of a selection of his numerous writings. During a period of upwards of fifty years he was actively engaged in the investigation and publication of the botany of North America, and studies of a wider range. As Prof. Sargent says, in his preface to the present collection, "The number of his contributions to science and their variety is remarkable, and astonishes his associates even, familiar as they were with his intellectual activity, his various attainments, and that surprising industry which neither assured position, the weariness of advancing years, nor the hopelessness of the task he had imposed upon himself, ever diminished."

The hopeless task, it may be explained, was a complete "Synoptical Flora of North America." Botanists need not be told how he laboured to complete this gigantic undertaking, even at an age when most men are past work. Taking up the work where the unfinished "Flora of North America," by Torrey and Gray, ceased thirty-five years previously, Gray published the remainder of the Gamopetalæ in 1878. This was followed in 1884 by a re-elaboration of the Compositæ and neighbouring natural orders; and the whole was re-issued in the form of one volume in 1886. This volume comprises about 1000 closely printed pages of descriptive matter—descriptive matter perhaps unsurpassed in botanical literature, and dealing with 567 genera and 3521 species. Whatever may be done by Gray's successors towards completing the "Synoptical Flora," his own contribution is a

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most valuable one—valuable because it embodies the whole of his numerous scattered writings on the group in question.

In making a selection of Dr. Gray's work for republication, Prof. Sargent naturally did not choose descriptive botany, though an index to the genera and species described in a variety of more or less inaccessible publications would be of the utmost service to botanists; for even under the most favourable conditions a long time must elapse before the completion of the "Synoptical Flora."

The selection, "which was found difficult and embarrassing," is limited to reviews of works on botany and related subjects, essays, and biographical sketches, and it is on the whole, doubtless, as good a one as could have been made. Gray wrote "more than eleven hundred bibliographical notices and longer reviews," and, as space for only fifty is found in a volume of 400 pages, it follows that "it was necessary to exclude a number of papers of nearly as great interest and value as those which are chosen."

Dr. Gray's method, if I may so term it, of reviewing the productions of his contemporaries was of such an instructive, temperate, and impartially critical character that these reviews have a permanent value. On reading some of them again, one is more than ever impressed with the fact that he made himself thoroughly acquainted with the works he criticized, and that he well fulfilled his duty alike to the public and the author. He did not hesitate to point out what he regarded as defects in the writings of his most intimate friends; but he was more careful to give an analysis of the contents of a book, with his own views thereon, than to condemn it on its faults or weak points.

These reviews cover a wide field, as well as a long period, and still remain profitable and interesting reading. The selection is too limited to be a history of botany during the last half-century, but it is sufficiently comprehensive to give an idea of the most notable events. It is true that the essays on the Darwinian theory are not here reproduced, as they had already been republished by their author.

The first volume, which is devoted to reviews, commences with a detailed notice of the second edition of Lindley's "Natural System of Botany" and ends with Ball's "Flora of the Peruvian Andes," reminding us of our most recent loss in the very small circle of private gentlemen who may be said to have studied botany successfully.

Early among the reviews is that of Endlicher's "Genera Plantarum," a work published at intervals between 1836 and 1840; and, almost at the end, a short article on the completion of Bentham and Hooker's "Genera Plantarum," 1862–83. In the latter we find a comparison of the number of genera admitted in various works of the same class, from the appearance of the first edition of Linnæus's "Genera Plantarum," in 1737, down to Bentham and Hooker, and remarks on the ideas of generic limits entertained by the different authors, and on the relative quality of their work.

Interspersed between these are notices of such widely different subjects as De Candolle's "Prodromus"; von Mohl's "Vegetable Cell"; Boussingault, "On the Influence of Nitrogen"; Bentham's "Hand-book of the British Flora"; De Candolle's "Géographie Botanique"; Hooker's "Distribution of Arctic Plants"; Ruskin's "Proserpina"; Darwin's "Insectivorous Plants"; and Wallace's "Epping Forest."

Among the fourteen "Essays" in the second volume, those on the longevity of trees, the flora of Japan, Sequoia, and forest geography and archæology, may be named as specially interesting.

The biographical sketches are thirty-eight in number ranging from Brown and Humboldt to Bentham and Boissier. As only some two hundred pages are devoted to them, these sketches are, many of them, necessarily very brief; but, as Gray had a personal knowledge of most of the men of whom he wrote, they contain original and interesting observations and facts not to be found elsewhere. And all who knew Dr. Gray will enjoy reading again his opinion of other men and their works.

W. BOTTING HEMSLEY.

MANURES AND THEIR USES.

Manures and their Uses. By Dr. A. B. Griffiths. (London: George Bell and Sons, 1889.)

THIS is a hand-book for farmers and students, and may be described as a smaller and less ambitious successor to the treatise on manures, by the same author, reviewed some months ago in NATURE. The principal value of this latter work consists in the direct information it contains as to sources of phosphatic, potassic, and nitrogenous manures, including guanos, in all parts of the world. The analyses, localities, amounts imported, and values, are all interesting facts for farmers, and this little book may well take its place in an agricultural library as supplying knowledge which otherwise might need research through many scattered sources of information. When, however, we consider the book as a means for imparting sound views on agricultural principles, we must advise caution on the part of the reader. Dr. Griffiths is one of those teachers who are infected with an inordinate affection for chemical manures. He believes, with M. Ville, that "the farmer who uses nothing but farmyard manure exhausts his land." Now, a man who starts with such an obvious fallacy can scarcely get into the right path. This doctrine is contrary to science and practice; and until Dr. Griffiths relinquishes it he cannot hope to enjoy the confidence of any farmer. We venture to put the matter in two or three positions from which it can be clearly viewed. Dr. Griffiths says, "This [farmyard] manure is erroneously supposed to contain *all* the necessary plant-foods required for the growth of crops." Erroneously! why, farmyard manure at least must contain all the constituents of straw, for it is largely made of straw. Similarly, it must contain the elements of turnips and root crops, when it is composed of them in no small proportion. Also it must contain the constituents of corn, because all meals and cakes which are consumed by cattle, and all hay, which is also consumed by cattle, contain the constituents of corn in the form of nitrogen, phosphorus, sulphur, potash, lime, magnesia, &c. Whether looked at chemically or approached through pure reasoning, it is clear that farm-

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